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ECONOMIC COMMISSION FOR EUROPE

**CONFERENCE ON PROBLEMS RELATING
TO ENVIRONMENT**

**Prague, with a study tour to the regions of Ostrava
(Czechoslovakia) and Katowice (Poland),**

2-15 May 1971

Distr.

RESTRICTED

ENV/CONF./F.16

21 April 1971

ENGLISH/FRENCH ONLY

ENVIRONMENTAL RESEARCH AND TRAINING IN UNESCO PROGRAMMES

Contribution from UNESCO

I. GENERAL OUTLINE OF UNESCO ACTIVITIES

1. The conservation of the environment in which Man lives and from which he derives his sustenance is one of the basic problems facing mankind. Considerable attention is being paid to this problem at the present time, because of the worsening of the situation from several points of view.
2. This problem has numerous aspects, relating to the countryside as well as the town, to the rational use of natural resources as well as to the degradation and pollution to which they can fall victim, to the consequences of man's actions upon the biosphere, as well as to the reactions of the biosphere upon man. Many Governments are presently preoccupied with this problem and this has prompted the General Assembly of the United Nations to foresee the organization, in 1972, of a United Nations Conference on the Human Environment to be held in Stockholm and, on a regional scale, the European Economic Commission to convene the 1971 ECE Conference on Environment in Prague.
3. The principal task of these meetings is the study of the problems of management presently facing the authorities, so as to enable them to undertake, on local, national, regional and international scales, the appropriate preventive or corrective measures and programmes.
4. A substantial amount of scientific and technical information already exists to help solve these problems, but this knowledge is not necessarily used and meets with obstacles of a political, economic, social, administrative or legal nature. It is to be hoped that the Prague and Stockholm meetings will clarify the nature of these obstacles, thus enabling them one day to be overcome.
5. Nevertheless, many problems are still unsolved, and many scientific questions remain unanswered in the field of natural sciences as well as in the field of social sciences. It is therefore essential to pursue and develop research in a coordinated manner, and at the same time to promote the education of specialists at all levels.
6. This necessity has led Unesco to promote, in the field of environmental sciences and natural resources research, an interdisciplinary, intergovernmental, long-term programme on Man and the Biosphere (MAB).
7. The initial stage in its preparation was the meeting, in September 1968 in Paris, of an Intergovernmental Conference of Experts on the Scientific Basis for Rational Use and Conservation of the Resources of the Biosphere. One of the recommendations of this meeting invited UNESCO to submit to its General Conference, at its 16th Session (October, 1970), a plan for a long-term intergovernmental and interdisciplinary programme on the rational use and conservation of the

natural environment and its resources, on the scientific, technical and educational aspects of the problems relating to rational use and conservation of natural resources, and to the improvement of the human environment and the increase in productivity.

8. In order to prepare this plan, the Director-General consulted Member States, Organizations of the United Nations family and non-governmental organizations concerned, as well as Unesco's Consultative Committee of Research into Natural Resources. Five expert working groups met in Paris from 3 to 14 November 1969, to formulate the specific projects which could compose the international programme.

9. This plan was defined in document 16 C/78 and on this basis, the General Conference of Unesco at its 16th Session decided to launch the intergovernmental, interdisciplinary, long-term programme on "Man and the Biosphere" (Resolution 2.313). According to this resolution, each country is invited to create a National Committee as soon as possible, with a view to defining and implementing national participation in the intergovernmental programme, as well as assuring a link at the international level.

10. These National Committees have been invited to give their views on the priorities to be established amongst the research themes proposed, and on the activities which their respective countries are interested in following up within the framework of the Programme. An International Coordinating Council, composed of representatives of 25 countries, as well as representatives of UN, FAO, WMO, WHO, Unesco, International Council of Scientific Unions and International Union for Conservation of Nature and Natural Resources, was created by the General Conference, with a view to planning the Programme and supervising its execution. It will meet in November, 1971 and, having before it the views expressed by the National Committees and the International Organizations, will be able to establish a programme of action which will become operational towards the end of 1971.

11. The Man and the Biosphere Programme will take its place, therefore, alongside the International Hydrological Decade and the Intergovernmental Oceanographic Commission, whose work also covers the field of the biosphere and the environment, and which are intergovernmental in nature, that is, the majority of their activities are carried out by the Member States themselves, Unesco assuring the necessary coordination and stimulation.

12. But Unesco's actions are not limited simply to the scientific aspects of the problems related to rational use and conservation of the resources of the biosphere. They also cover social, cultural and educational aspects of these same problems of primary importance.

13. As part of the Unesco social sciences programme, a long-term project "Man and His Environment - Design for Living" was approved by the Unesco General Conference at its fifteenth session in 1968 as a multi-disciplinary undertaking on the manner in which man has shaped his environment and what he can do to avoid waste, pollution and the unnecessary destruction of scarce natural resources. The project is necessarily related to and to be coordinated with, the much larger intergovernmental programme on "Man and the Biosphere" referred to above. That programme pays attention to large scientific and technological questions, chiefly of an objectively definable kind. The "Man and His Environment" programme has a more restricted, special focus. That focus is on the micro-environment, on man himself, on the creation of favourable social relationships in a genuinely human environment. It asks always about the quality of the life which is offered to individuals, families and communities under the pressures of environmental change. In speaking about a 'design for living', it is not, therefore, being rhetorical but it is raising the question of dignity in human relationships, of how that dignity is enhanced or reduced by the environments within which we live. The project therefore turns towards questions of perceptions, attitudes and behaviour in relation to the environment, city planning, architecture, aesthetics, the development of environmental indicators, the practice teaching and appreciation of the arts, cultural policies, the right to privacy and the right of access to culture, the potentialities of mass communication.

14. In 1970, an interdisciplinary symposium on "Man's role in changing the environment : architecture and urbanism for growth and change", was held at Otaniemi, Helsinki in Finland. The symposium identified the need for a concerted approach which implies the development of perspectives that synthesize those emerging from traditional academic disciplines. Later in the year a group of consultants discussed short-term and long-term social sciences programmes on environment.

15. In the field of cultural and human sciences, the Unesco programme on the preservation of sites and monuments and historic quarters represents an important international attempt to enhance the quality of the human environment.

16. Contemporary civilization is based on the achievements of different cultures in the past. Historically and artistically important religious and temporal structures need to be preserved as part of our debt to the past.

17. However, preservation embodies more than the problem of monuments. In many areas of the world mushrooming growths of urban populations have resulted in demolishing historically interesting quarters and their replacement by anonymous, high-rise structures. The disappearance of social units such as the "neighbourhood", with their intimate social groups and network of mutual responsibility have resulted in depersonalized societies accompanied by the rise of "anomie", lack of social responsibility, and other social ills which characterize many urban societies.

18. The preservation and adaptation of historic quarters to contemporary needs and standard of living would not only contribute to variation in the visual rhythm of the city, and of the manner of living, but also ensure that the hearts of cities remain heterogeneous in social structure and thus viable instead of becoming lower class quarters eventually slated for demolition and replacement. Preservation should thus be considered as one of the means to be used to maintain the quality of the urban environment. Planning should take these factors into account for economic factors including taxation, long-term interest loans; and administrative policies including strictly enforced zoning regulations must be among the measures to be considered.

II. SCIENTIFIC CONTENTS OF UNESCO PROGRAMMES

A. Man and the Biosphere

19. The Programme proposed in document 16 C/78 consists of approximately 30 scientific projects. They are all considered to be of global or of major regional importance and are of such a nature that an intergovernmental approach to their pursuit will be either essential or highly beneficial. Each theme contains a number of proposed activities which involve the employment of interdisciplinary skills and include in many cases the participation of specialists of both the natural and the social sciences in unified research directed toward a common, scientific objective. Each theme will require participation at a national level with co-ordination at the international level.

20. Each theme represents a necessary focus for interdisciplinary action directed toward solution of a particular problem or related group of problems. One must emphasize that these projects deal with numerous problems for which research has already begun in certain countries, and others for which the research and

continuous control activities have been led by or developed under the auspices of international organizations. The Man and the Biosphere Programme should therefore give a new impetus to these efforts, and a common perspective and organization.

21. The projects are divided into 4 groups :

(i) Themes related to the natural environment, meaning environments that are little modified by man

This group comprises such projects as :

- Definition, classification and mapping of ecosystems
- Mapping of world vegetation
- Comparative studies of soils categories, based on world soil map
- Analysis of ecosystems, their structure and functioning, energy flow and productivity
- Distribution and cycling of important bio-geochemical elements
- Photosynthesis, growth and primary productivity
- Plant-Soil-Water relationships
- Base line studies of undisturbed ecosystems in comparison with modified ecosystems, including identification of biological indicators
- Role of consumers in ecosystem dynamics
- Co-ordinated world-wide network of national parks, biological reserves and other protected areas
- Conservation of wild plant and animal species

(ii) Themes related to the rural environment, meaning environments used primarily for agriculture, forestry, or other uses that do not involve major technological transformations of the landscape

This group comprises projects such as :

- Comparative analysis of agricultural, managed forest and natural communities as total ecosystems
- Research and studies in agricultural bioclimatology
- Transformation of vegetation in relation to productivity, hydrology and stability of ecosystems
- Role of introduced species in ecosystem functioning and stability
- Optimum use and long-term effects on production and on ecosystems of organic and inorganic fertilizers
- Use and role of fire in ecosystems modification
- Ecology and performance of wild and domesticated grazing and browsing animals

- Studies on the ecology of decomposer organisms and on the effects of man-made changes in the environments on the recycling capacity of soil organisms
- Ecology and rational use of island ecosystems
- Human adaptation, land use and environmental relationships in extreme environment, including deserts, high mountains, polar and sub-polar regions

(iii) Themes related to environments affected by urbanization or subject to major technological modification by urban-industrial society

Including such projects as :

- Impact of urban ecosystems on the structure and functioning of the biosphere
- Effects on man and his environment of major engineering projects, river-basin developments, pest and disease eradication schemes and other major modifications of ecosystems
- Effects on man and his environment of recreation, tourism and related developments
- Ecology and rational use of estuarine regions and the coastal zone
- Environmental and socio-economic criteria influencing optimum use of various biotic regions as a basis for urban, rural and regional planning
- Perception and definition of the ecological and cultural bases for environmental quality

(iv) Themes concerned with pollution or related phenomena, as they affect the biosphere

Including such projects as :

- Inventories and toxicology of environmental pollutants
- Monitoring of global changes in pollutant levels
- Investigations of man's long-term influence on the heat balance of the Earth
- Systematic observations of the factors and processes leading to eutrophication and chemical pollution of fresh waters

22. It is recognized, however, that each ecological region faces specific problems which are of great importance to the nations located in, or including that region, but of lesser concern to other nations. Within each region, therefore, a coordinated programme of action is needed involving application of the more general research proposals to the specific needs of the region as well as pursuit of those special research projects particularly adapted to that region.

23. Many problems affecting man's interactions with the biosphere can most effectively be tackled by analysis of biological systems considered as a whole, this involving the development and application of the systems analysis

approach and the establishment of mathematical models which can be used for predictive purposes. By exposing ecosystems to a variety of experimental stresses and the use of stimulation and sensitivity procedures, it will be possible to build up models that can be used for management purposes and for comparison of temporal and spatial variation in the structure and functioning of the biosphere.

24. At certain carefully selected sites it will be important to carry out complete studies on ecosystem functioning, this involving sophisticated technology and interdisciplinary teams of personnel. In many places, however, emphasis will be laid on particular processes in particular biomes or biological systems. In the following treatment, therefore, research themes are grouped in relation to the biome, ecological region or geographical area to which they are particularly appropriate; tropical forest biomes, tropical grassland and savanna biomes, desert and semi-desert biomes, Mediterranean woodland biomes, temperate grassland biomes, temperate forest biomes, tundra and tundra-park mosaic biomes, high mountain biomes, aquatic ecosystems and urban systems.

25. The implementation of the MAB programme will require the creation or strengthening of ecological research stations, environmental monitoring stations, biological reserves and others. A group of basic operations and networks of stations will thus compose the framework indispensable to the execution of the above-mentioned projects.

26. Finally, the MAB Programme will receive the support of a certain number of traditional activities of the Natural Resources Research Division of Unesco, particularly those concerning integrated studies of natural resources, ecological, pedological and geomorphological research, etc.

27. In this respect a specific proposal was presented to the 16th Session of Unesco's General Conference, with a view to studying the possibility of creating a European Centre of Applied Ecology. A conference of European governmental experts will be convened, in cooperation with ECE, at the end of 1971.

B. Hydrology

28. The part of Unesco's programme dealing with hydrology also includes the study of the human environment, as it aims at providing a scientific basis for the rational use of water resources for the benefit of humanity.

29. All modern societies have to face the increasing demand for water,

inseparable from economic and social development. The International Hydrological Decade, launched by Unesco in 1965, has created and will continue to create the framework of worldwide cooperation for the evaluation, use and conservation of water resources, based on hydrology.

30. So great is the importance of these problems that the International Hydrological Decade will be followed by a long-term programme covering the collection and processing of basic hydrological data, studies of large-scale hydrological processes, research on various hydrological phenomena and on the methods of calculating the principal parameters with a view to preparing plans concerning water resources, and finally teaching and training activities.

31. The mechanism on which the International Hydrological Decade is based is paralleled by that which will be used for the Man and the Biosphere Programme, that is, an International Coordination Council and National Committees. The Decade has already achieved important results which were reviewed by the "Mid-Decade Conference" convened in Paris by Unesco in December, 1969. Suitable cooperation will be established between this programme and the Man and the Biosphere Programme.

C. Marine Science

32. The programme of the Unesco office of Oceanography has two facets. On the one hand it promotes the general advancement of oceanography, including physical, chemical, biological and geological studies. The objective here is primarily to assist particularly developing countries in establishing marine science activities. Particular emphasis is therefore given to education and training programmes, but also to methodology, encouraging regional activities and assisting with information exchange services.

33. On the other hand, Unesco provides support for the Intergovernmental Oceanographic Commission (IOC) both through supplying secretariat and financing meetings of the Commission and its subsidiary bodies. The purpose of the Commission is to promote scientific investigation of the oceans through concerted action of its Member States; thus regional co-operative surveys are co-ordinated. Arrangements are made to ensure the international exchange of oceanographic data. The Commission sponsors the Integrated Global Ocean Station System (IGOSS) for monitoring the ocean environment and studies the legal aspects of conducting research in the ocean. The IOC co-ordinates the Long-Term and Expanded Programme of Oceanic Exploration and Research (LEPOR). To play this role its statutes have been modified in various ways, including

arrangements for the equitable participation of other organizations of the UN system, some of whom already provide secretarial support to the Commission and are co-operating in other ways. Under the Long-Term and Expanded Programme, a high priority will be given to the scientific aspect of marine pollution.

D. Social Sciences

34. As described earlier, the interdisciplinary symposium held in Helsinki in 1970 was the first activity in the social sciences programme of Unesco in the field of the human environment. The following subjects were discussed at the symposium :

1. Ecology and the escalation of human impact
2. Models of growth and change in society
3. Human perceptions of the environment
4. Architecture as a bio-science
5. Urbanization as a response to the humanization of life
6. Approaches to the measurement of the environment
7. Implications for a concerted design for living

35. The following major points emerged from the symposium : Man's drive to exploit the natural potentials of his environment can be approached analytically from three viewpoints : ecological balance, evolutionary change and accepted ethics. Industrialization and its concomitants have seriously increased the scope of unbalanced environments, which have themselves become constantly wider, because insufficient attention has been paid to undesirable side-effects. Nations have tended to deal with the consequent degeneration in partial ways and without the necessary international links. In the developing countries, concern for immediate problems of minimum human welfare has been a matter of top priority and, even if environmental problems can be foreseen, the expense connected with measures of control is often prohibitive. While mankind has in the past shown much versatility in adapting to changing environmental conditions, it would seem that current environmental degeneration - some of which may prove to be irreversible - is proceeding faster than the genetic human capacity for adaptation. Unless urgent steps for environmental management are taken, mankind may therefore be faced with catastrophe. Yet the problem of environmental control and management is at bottom an ethical one, and must be approached in those terms.

36. Societies are changing at different rates and in different directions, and it is from the background of the ethics and values underlying such changes that specific measures of environmental control must be derived. Social categories, concepts or images must be translated into spatial planning and organization by teams working on different problems, which must also take into account continuous alterations in needs, circumstances and ideals.

37. The psychological perception of the environment, attitudes to space and consequent behavioural patterns are matters which have not yet been studied as attentively as they deserve. However, they raise operational problems both from the administrative and technical points of view, insofar as they may conflict with solutions designed for the mass consumer and which are responding to popular pressures. A mean must therefore be struck between group and individual preferences and between the more and less stable elements of such preferences.

38. How is environmental management to be implemented professionally ? One approach is simply to give architects, as artists and design creators, the upper hand. Another approach is to consider architects as synthesizers, drawing upon various sources of technical and scientific support. At the present stage, however, what appears most desirable is to professionalize planning as a collective enterprise, involving multidisciplinary teams working together to solve problems as they arise in particular situations, and without giving primacy to any single traditional discipline or professional role. From this, an operational science of environment could be expected to emerge gradually, adapted to different scales of planning, from the effect of flora and fauna on architecture to micro-design.

39. Discussing urban settlements, the symposium rejected the concept of optimal city sizes or approaches in terms of centre-and-periphery. Urban settlements must be considered in terms of the facilities and communication networks they provide and can thus grow enormously without necessarily losing efficiency, especially if they are planned on micro-area bases whereby local institutional completeness is achieved and the city becomes a collection of poly-centric units. In several developing countries, urban settlements of 15 to 20 million inhabitants can be foreseen in the fairly near future and this change will also gradually destroy the rural-urban dichotomy. The identification of social ills specifically linked to urban living also becomes more difficult as the borders between country and city, centre and periphery tend to dissolve.

40. The assessment of environmental quality through research is a delicate matter. Some of the variables are much more easily quantifiable than others, even such universal ones as health. Some clustering of variables is no doubt possible, but available techniques of social research have not as yet been fully brought to bear on environmental measurement nor has the relationship between such research and operational planning been adequately defined. Not all environmental variables are directly relevant to planning, so that very elaborate research models are not always needed; in any case, the contribution of research is probably more important in the long-range than for the solution of immediate problems.

41. Finally, the symposium discussed the particular dilemma faced in many developing countries : the rise of urbanization without industrialization. This makes the urban model of the developed countries largely irrelevant, though certain mistakes can be avoided by examining these models. Stress in city planning must be on a functional mix of land use, and some degree of stability may be achieved through temporary housing and self-help schemes combined with permanent community foci, such as schools and shopping centres.

42. In 1971-1972, several studies on perceptions, attitudes and behaviour in relation to the environment will be undertaken on a cross-cultural basis in different parts of the world. The problem of environmental quality control and development planning is, at present, also the subject of a study. In addition, a meeting of experts will discuss on an interdisciplinary basis population-resources ratios and their future implications, bearing in mind the impact of the population growth, urbanization trends, and technological development.

E. Culture

43. One of the major efforts of Unesco in this field is the establishment of international standards for the protection of cultural property. Starting with the convention on the Protection of Cultural property in the Event of Armed Conflict of 1954, Unesco has sponsored several other international measures such as recommendations on International Principles Applicable to Archaeological Excavation (1956), on Safeguarding the Beauty and Character of Landscapes and Sites (1962) and most recently, the convention on Prohibiting and Preventing the Illicit Export, Import and Transfer of Cultural Property adopted in 1970.

44. Unesco has sent missions and undertaken researches to examine and recommend treatment for the preservation of monuments and sites all over the world. The Nubian Campaign is only one of many such activities by Unesco. Assistance is currently rendered to preserve the monuments including Borobudur (Indonesia), Mohenjo Daro (Pakistan) and Philae (United Arab Republic). Education of museographers and technicians is another aspect of Unesco's concern. For this purpose courses in the conservation and restoration of cultural property are being organized in different parts of the world.
45. Unesco's cultural programme is further concerned with the development of professions as they relate to enhancing the quality of the human environment. One specific activity in this respect is the study of the changing role and function of the architects in society. For this purpose, in 1970 Unesco organized an international meeting of experts on the education of the architect held in Zurich, Switzerland. The meeting examined the role and responsibility of the architect in contemporary society; the education of the architect in relation to social, cultural and economic development; new trends in the education of the architect including interdisciplinary relationships (physical and technological sciences, human and social sciences; visual arts and environmental design); the place of urbanism and environmental sciences; and the contribution of new concepts of education.
46. The meeting also studied trends which indicate future development in the field of architecture education, and made general suggestions for a new curriculum in this field. The results of the meeting will serve as reference material to be used in the structuring of a pilot project on the education of architects to be initiated by Unesco within a Member State in 1972.

III. EDUCATION, TRAINING AND INFORMATIVE SUPPORTING ACTIVITIES

47. The desire to acquire new data in the scientific fields resulting from careers which are in themselves new, to instill into human culture the respect for the potential of the natural environment, to make populations aware of the quality of their environment, all this requires the training of specialists who are indispensable to the implementation of the research programmes. At the same time, the teaching of environmental sciences in universities, training colleges, secondary and primary schools must be stimulated, and collective educational measures taken, especially the dissemination of relevant information to the general as well as to the specialized public.

A. Educational research projects

48. Effective environmental/^{education}programmes must be based on the general world-wide needs in this field as well as on the motivations and requirements in the different regions and countries concerned. Since there is a wide variation between countries, a series of regional surveys will be carried out, including consideration of curricula, evaluation of present facilities and provisions of the assistance necessary for the introduction of relevant ecological (social sciences and cultural) components into present education programmes. The data gathered should be fully used to allow the widest possible comparison, periodic re-evaluation of the trends and the periodic projections required for better planning.

B. Education and training activities

49. The basic aim of these activities (which have been conducted for a number of years and will receive fresh impetus through the Man and Biosphere Programme) will not only be to train the environmental specialists needed, but at the same time to promote and stimulate educational activities in environmental sciences at university level, in teachers' colleges, in primary and secondary schools, as well as in out-of-school education for youth and adults. Curricula for all levels of education will also be revised or developed. It will be necessary to strengthen or create national training and research centres for environmental sciences, as well as to stimulate the organization of national training courses in fields in which the shortage of properly trained specialists is a stumbling block for the proper execution of the proposed programme.

50. The training of technicians for ecological research, including ecosystems analysis as a basis for management, systems analysis and remote sensing, will receive special attention, since this appears to be, and is likely to remain, one of the major obstacles to the development of the type of research activities which will constitute the core of the long-term programme.

51. At the university level, both graduate and post-graduate, a major effort will be made, particularly to introduce ecology and ecological thinking through the formulation and adaptation of the necessary teaching programmes covering the different disciplines involved and adapted to the needs of the country. Thus, special teaching programmes and courses for technicians dealing with the natural and socio-cultural environment, such as architects, agriculturalists and foresters, will be promoted. Attention will equally be given to the introduction

of ecology in the training of potential decision-makers such as economists, lawyers, politicians (and those trained only in the social sciences, humanities and arts). Finally, efforts will be made to stimulate a proper concern of environmental problems and values in those presently responsible for policy and decision making.

52. A series of meetings amongst scientists on subjects connected with the programme will be organized so as to contribute to the development of knowledge and to promote the most active exchange of information.

53. The creation, at the highest attainable level, of multidisciplinary training and research centres in general environmental ecology will be further promoted in various geographical regions, at local, national or multinational level, with a view to the training of potential leaders in this field.

C. Information for the general public

54. Regarding the general education of the public on the relationships between man and his environment, a series of out-of-school activities designed to provide adequate information will be carried out, such as the preparation and production of relevant audio-visual materials in different languages, the strengthening - or creation if necessary - of regional or national mass media centres and other pertinent activities leading to an awareness of the need for man's active participation in such programmes. This should also include assistance to museums, national parks and other relevant institutions in the adoption of more dynamic policies and programmes in the field of environmental education and information.

